HOUSE OF COMMONS SESSION 1992–93

SCIENCE AND TECHNOLOGY COMMITTEE

THE ROUTES THROUGH WHICH THE SCIENCE BASE IS TRANSLATED INTO INNOVATIVE AND COMPETITIVE TECHNOLOGY

MINUTES OF EVIDENCE

Wednesday 7 July 1993

Sir Anthony Gill,
Mr P Slater, Mr B Tyler, Mr A Palmer and Mr H Kemp

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WEDNESDAY 7 JULY 1993

Members present:

Sir Giles Shaw, in the Chair

Mr Spencer Batiste
Dr Jeremy Bray
Mrs Anne Campbell
Cheryl Gillan
Lynne Jones
Mr Andrew Miller
Mr William Powell
Sir Trevor Skeet
Sir Gerard Vaughan

Examination of Witness

SIR ANTHONY GILL, Chairman and Chief Executive, Lucas Automotive Limited, was examined.

Chairman

495. Sir Anthony, good afternoon. Thank you very much for coming.

(Sir Anthony Gill) Thank you.

496. You will be well aware that our Committee's investigation is one into the transfer from the Science Base into innovative technology and I should imagine you would agree that your particular company is extremely well placed to be able to talk to us about that matter. You are serving a number of very significant industries, a wide range of competitive markets, with a wide range of very different systems and components. I think I would therefore like to ask you, as an opening question, if you would care to describe to us, if I was to put that to you as a company, how could would you describe the route through which you interpret science into innovative technology within Lucas.

(Sir Anthony Gill) Well, our starting point is really the market becoming aware of what our customers or potential customers would like to have from us, sometimes trying to be aware of that before they become aware of it, by looking at the trends in the marketplace, which of course for us is aerospace automotive.

497. It is customer driven, or are you active in advance of your customer in guessing what the new technology should be?

(Sir Anthony Gill) Sometimes. If I can give you an example of that, 18 years ago we had a very bright chap who has now retired, who foresaw that in time, vehicle engines would have to be less noisy, consume less fuel and be cleaner and have a cleaner exhausts. So 18 years ago he devised a concept for achieving that, in diesel engines,—large diesel engines for trucks—and that was before the truck makers were asking for that sort of system to perform in that way. It has taken 18 years for us to actually find two customers who are now buying that product, but the concept in that case came before there was a defined need from customers in the marketplace.

498. And you made a significant investment in the development of that technology, forecasting that the market would need it?

(Sir Anthony Gill) Yes.

Sir Trevor Skeet

499. The internal combustion engine is only about 32 per cent efficient and we learned from a visit to Ricardo Engineering that existing manufacture is inclined to be a little slow in providing funding for technology. Do you think that we are proceeding far enough for the survival of the industry?

(Sir Anthony Gill) I think so. To say: "I think so" sounds complacent, but I think by "the industry", what do you mean? Which industry?

500. The automotive industry.

(Sir Anthony Gill) Yes, the automotive industry has for many years now been a worldwide industry and I think the messages that the British part of that industry should have received in the late seventies, were certainly received in the early eighties and since then the responses from the industry, or sectors of the industry, the vehicle makers and the component makers, I think have been quite reasonable.

501. But Sir Anthony, you are right in the forefront of technology and if you find the internal combustion engine only 32 per cent efficient, do we have to live with this low standard of efficiency?

(Sir Anthony Gill) Well, no. You are referring, possibly to a gasoline engine and I am strongly in favour of diesel engines, rather than gasoline engines. I have to say that very carefully, because behind me are Ford and Lotus and only Ford make diesel engine cars. We do not have Lotus putting diesel engines in their cars yet. But the movements that have been made in engine design worldwide have steadily, if slowly, improved the efficiency of engines— and Ricardo, of course, have played a part in that.

502. I notice in the Financial Times this morning that diesel engines are now one in every five cars being produced, which is a great fillip for the industry. What do you see of the prospects in this particular sector for you?

(Sir Anthony Gill) Very good. The figures you quoted are for the UK only. The figures for other continental European countries are much higher than 18 per cent. In France and in Spain there are months when more than half the new cars produced fit diesel engines, so that is good news for us. Lucas

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[**Sir Trevor Skeet** *Contd*]

has a 32 per cent share of the European car diesel market and we see that overall share increasing, if the UK use of diesel engines in cars increases from its current level up to the level achieved in other countries.

Lynne Jones

503. Could I chip in there? What accounts for the difference in the level of diesel production on the continent, and the UK, do you think?

(Sir Anthony Gill) It is partly the history of the development of diesel engines in the country. Diesel engine cars were developed in Germany and France before they began to be adopted in the UK. But the main driver, at the moment, is fuel cost. In some countries, the cost of diesel fuel is substantially less than the cost of gasoline, to the user at the pump. So we would favour—but we would say that would we not—a tax incentive for diesel or a tax disincentive for gasoline, in order to get more diesel fuel and diesel engines used in cars. Since diesels have cleaner exhausts and use less fuel, this would make "green" as well as economic sense.

Sir Trevor Skeet

504. Could I just pursue one further point? You happen to be in the advantageous position of being in aerospace and also the automotive industry. How do you successfully move technology from one, across to the other?

(Sir Anthony Gill) Well I would like to make two comments in reply to that question. The first is, we have focused our core activities on products and systems which use similar technology in both aerospace and automotive, trying to get synergy between them. If we were not in such similar areas, obtaining such benefits would be rather more difficult. Secondly, we have a device in the company which we call the Group Technology Council, which is a collection of the most senior men in technology in each of our major businesses in the group. They come together to tell each other about their problems and more importantly, their solutions. They are allocated themes. So, although they may represent say car braking or diesel fuel injection equipment from their business, they are allocated themes, like electronic control, or materials, that is a specific technology area to look at. They also develop a relationship with "Lucas professors". We have 14 or so Lucas professors, who are professors in chosen areas important to us, for whom we pay part of their salary, in order that better people can be hired into these chairs. A combination of the input from the professors, in their own speciality, the Council's attention to emerging areas of technology and the Council Members' understanding of these common problems they have and the need to address them in a coordinated way, helps us to stay up with —and preferably ahead of—the emerging opportunities to apply that technology. That is a very important device. We have it chaired by a non-executive Chairman, who is actually Sir John Fairclough,—who used to be scientific advisor to the Cabinet. He does not have any right to make decisions; he just knocks heads together and encourages people to share their views and be innovative in their ideas.

Chairman

505. Do you think that MoD's increased commitment to "spin off" from military developments will be of benefit to you?

(Sir Anthony Gill) Well, it may be. I hope it is, but we are not depending on it.

506. Very wise.

(Sir Anthony Gill) We have our own rules for defence equipment. We try to avoid developing, selling or taking contracts for products unless the technology has an application in civil, as well as defence fields.

507. That is the principle by which you will abide?

(Sir Anthony Gill) We would normally not bid for a defence contract, unless the product has a technology that was shared with a civil application. We disobeyed the rule once and we have a missile casing factory in Burnley to prove it! It is the best in the world, but we cannot think of a civil application for the product!

Sir Gerard Vaughan

508. This crops up from time to time, we have heard there is renewed interest in using electricity, battery operated vehicles. Is this reality? Is this serious?

(Sir Anthony Gill) I do not know whether to say, "I hope so", or "I hope not". I hope so, because it would perhaps be helpful to cleaning up the air a bit more. But I hope not, because we decided to get out of electric vehicles, believing that we would never be commercially successful. One does not ever like to be proved wrong!

Mr Batiste

509. Have you any experience of developments produced within a military contract being marked by MoD for use in civil technology?

(Sir Anthony Gill) No.

Mr Miller

510. You referred to your Committee chaired by Sir John Fairclough and respond in your questionnaire, you described yourself as "an innovative company". Beyond that, how do you maintain your competitiveness in the market share in what is a developing high tech market? Do you have a long-term strategy or do you focus your efforts on a project by project basis?

(Sir Anthony Gill) No, we have a long term strategy. In both the markets we serve, aerospace and automotive, there are fewer customers as the months go by. They are either buying each other up, or merging or forming alliances. Each of those customers has a policy for reducing the number of its

[**Mr Miller** *Contd*]

suppliers, to reduce the costs of purchasing. So, by definition, there are going to be fewer suppliers and each of those suppliers has to be larger. So, the critical size one has to be, to stay competitive, satisfying the customers, is getting bigger all the time. We, recognising that, have done two things. We have sharpened the focus on our successful businesses; we call them our "core businesses", and have divested other activities that are not supporting those core activities, in order that our resources,—the people and the money—can be focused on core businesses. The second thing is that we have moved what we do for our customers up the technology chain, so that we are able to offer integrated sub-systems to the vehicle makers—systems that are complicated and sometimes more complicated than customers want to make for themselves. These, together we hope, are going to maintain our competitiveness in the eyes of those customers and make them continue to value us as suppliers.

511. That is done on the basis of a strategy within, let us say the braking systems part of the business, rather than a strategy that is specifically aimed at Ford or whoever.

(Sir Anthony Gill) It is a combination of strategies developed within individual businesses, with some cross over,—because the technology crosses over from one business to another—and the evolving wishes of our customers, as they expect more from their suppliers and want to work with their suppliers more closely. The Japanese call this an "extended enterprise" and they regard their suppliers as an extension of themselves, sharing knowledge about the demands that they see in the market, and the opportunities they see in the market. We depend very much on developing that relationship with each of our customers, so that we share the challenges and opportunities.

Mr Batiste

512. According to your response in the questionnaire, you indicated you spend about four per cent of your turnover on R&D currently and about one per cent of it was spent externally to the group and three per cent internally. Could I start by asking you, do you believe firstly that your institutional investors adequately value R&D in their approach to your company?

(Sir Anthony Gill) May I just comment on the four per cent? The four per cent is if you divide our R&D expenditure by our total sales. But about a third of our sales are into the after-market,—keeping what we have supplied in the past as serviceable in the hands of the user. So really our spend is nearer six or seven per cent of our original equipment sales—the sales that result from that R&D spend! As for city and the shareholders—I have to distinguish between the two— because there are plenty of people in the City who comment about Lucas, who do not own shares in Lucas. On the other hand, most of the people who own shares in Lucas have owned shares in Lucas for years and years and years. We have obviously focused our attention on the latter and take steps to ensure that the majority of our shareholders—and probably the top 25 would account for 60 per cent of our shares,—understand what we are doing. They have only bought shares in Lucas because they know the company and they must like it. They cannot listen to us over and over again, twice a year when we talk to them, and not realise how important technology is to us! And so among our shareholders, as distinct from commentators who write on pages in the newspaper, at the head of which says, "City", I think they understand what we do and would not, at any stage, be reluctant to continue to be happy about our level of spend on research and development.

513. The pattern that we have perceived is in considerable contrast between the amount of R&D that companies do in-house, and the amount they buy out in universities and other institutions. Your's appears to be one point in, to three points out, that sort of proportion.

(Sir Anthony Gill) Sorry the wrong way round.

514. I understood you were saying very little of it was actually undertaken externally?

(Sir Anthony Gill) Very little is undertaken externally.

515. That is about right. Why is it that pattern? Do you not feel there are resources in our own domestic Science Base, which you could be utilizing profitably?

(Sir Anthony Gill) There are some and we do utilize them and I have already described one way in which we do, which is to have about 14—at the moment—Lucas professors. We would like to do more outside, specially if it is in universities, because it is cheaper. But the problem is that the products we make—the systems we make—are fairly peculiar and they are special to us. We are number one, two or three in the world in each of these areas. So it is difficult to find people outside the company who have the capability to push our knowledge further. So, it is not that we have something against the outsiders, it is just that we find the best overall capability inside.

516. Obviously you have a lot of bright people working for you, spinning off all kinds of ideas which you exploit. Of the ones which you undertake serious initial research about, what proportion of them should come through into viable commercial products?

(Sir Anthony Gill) About point one of one per cent—so, one in a thousand.

Dr Bray

517. Does the threat of takeover materially effect either the scope or the continuity of your development work?

(Sir Anthony Gill) I beg your pardon?

518. Does the threat of takeover materially effect either the scope or continuity of your research and development?

(Sir Anthony Gill) No, because the company in its future depends on a continuous flow and

[Dr Bray *Contd*]

development of new ideas and technology. It does not really matter who owns us. Now, if we were to say that we should improve our short term performance in order to defend ourselves from somebody from taking us over, or in order to convince our existing shareholders that it is worth keeping us, that would be, in our opinion—the Lucas management opinion and the Lucas Board's opinion—very short-sighted. It would be rather like chopping an oak tree down; it is easy to do, but when you finish and you want an oak tree, it takes a long time to grow it back. We realise that it is vital for the future of the company to have investment in R&D and to develop new technology.

519. I can see that is your view and that of your Board and it may well be our view too. Is it a view you find easy to put across to the City?

(Sir Anthony Gill) No, I do not think anything is easy to put across to the City especially if by "City" you mean these people who write in the newspapers with "City" across the top of the page. However it is not difficult to get across to our shareholders. Our shareholders understand it. That is why they bought shares in the company, and it is, we hope, unlikely they will be 'conned' into selling their shares on the cheap, just because somebody came up with the idea that we were a takeover candidate.

Mrs Campbell

520. In your introduction you said that 18 years ago you had a far sighted manager who predicted that the reduction of noise and pollution was necessary and this was before truck makers were actually asking for that. Presumably you have some ideas about how the nature of the car may change over the coming decades, with the introduction of new materials and power sources, for example? So I assume you do have research and development programmes in place to cope with that sort of change. If so, can you give us any sort of indication of their size relative to the current mainstream programmes?

(Sir Anthony Gill) It is difficult to generalise about that, but we have an overall programme which divides into—very crudely—three parts. Firstly there are programmes—which are really more development programmes than research programmes—within any one business of Lucas, targeted to improve their product, or apply the product to an even more demanding situation. There are some projects that go on across businesses, because what is needed by way of new technology for those businesses is common; so for example, in the electronics field, we would not only have a programme that covers all the businesses in electronics, whose performance of their products is enhanced by electronics, but we actually have an electronics business in which as this work goes on. This is a more cost effective way of doing it in one place than doing it in each of the other areas. So there are collaborative programmes. Then the third is the Group Technology Council, to which I have referred, who have, each year, the opportunity to identify projects for the longer term future—developing technology for which trials would be organised to test the technology. That programme is about £5 million. So, in total, about £100 million is R&D expenditure—out of a turnover of two and a half billion—which passes the Frascati definition in the accounts. There is another 60 million which is still engineering—it is still really "D", but it is customer orientated "D", so it does not qualify as innovation! In the overall total of a hundred and fifty million, it is about five which is really centrally directed R&D programmes with, currently, no obvious short or medium term commercial exploitation opportunities.

521. I suppose it would be a commercial secret to tell us what long-term programmes you are pursuing?

(Sir Anthony Gill) Yes.

Mr Powell

522. I want to ask you about the effect of inward investment and particularly by Japanese companies. What impact have they had, both in terms of your market share, the way you conduct business and the way in which you deal with your suppliers?

(Sir Anthony Gill) Well, in each case it has been helpful. Lucas has an interesting history with the Japanese. About 30 years ago, some "bright spark" in Lucas went over to Japan and sold licences to the Japanese in car braking manufacturing, and ever since then, the licences have been renewed. That is a rather remarkable thing, but they have been convinced that the new technology that is being developed in car brakes by Lucas in Europe, in the UK and Germany, is worth continuing to pay royalties for. That is a satisfactory story in itself. The 'bonus' that we have from that, which we did not expect, was when the Japanese car makers came to Europe, and fortunately to the UK, they did not need to be told about Lucas. The name "Lucas" was already known. It was a technology that their brake suppliers in Japan were using in the cars made in Japan. Two thirds of the cars made in Japan, some years ago, used braking equipment incorporating Lucas technology. So we did not have the same trouble as some British companies had in getting introduced to the Japanese when they came here. The Japanese do have a better understanding and a more well developed idea of the 'extended enterprise' that I was talking about—of having a relationship with their suppliers that is a sharing relationship. Most of the other companies in the automotive industry are now either moving in that direction, or are already well on with that, but the Japanese invented it. So we have seen that benefit to us in the UK, particularly in Europe, as a second benefit. The first was that they knew us! The emphasis that the Japanese put upon quality has been helpful and the way in which they have developed and exploited manufacturing methodology, has also been helpful. But we picked that up—and started applying that in Lucas—before the Japanese car makers came to the UK. That is a rather rambling response.

523. Market share, any observations on market share?

[**Mr Powell** *Contd*]

(Sir Anthony Gill) Our market share with the Japanese?

524. As a consequence of Japanese inward investment?

(Sir Anthony Gill) Our market share has not changed very much, because most of the Japanese cars are substitutional. People decide to have a car, do not decide to have two, because a Japanese one is available. They just buy Japanese and, as a result, do not buy something else. If we had the business on the car they do not buy and we have the business on the Japanese car they do buy, it is better than not having it—but it does nothing very much to our market share. This is a sometimes misunderstood factor about the Japanese production of vehicles in the UK. It is better that they make them here than anywhere else, but the fact of the matter is, whoever is buying them, are buying Japanese cars instead of some other car. So if you are an international supplier of equipment to the motorcar industry, it does not do much for your market share—except reduce it, if you do not go into business with the Japanese!

Lynne Jones

525. Do you think you would have maintained that position, had you not gone out "X" years ago and talked to the Japanese? On a slightly different tack, when I was a Parliamentary candidate, we were invited to come and meet your company at Shirley, and they showed us all sorts of exciting ideas for the future in terms of vehicles, cars going down motorways, guided systems. Are we making enough progress in that direction in the UK—I do not think we are - and how could we accelerate that progress, because certainly it seems to me to be something for the future, both environmentally and on safety grounds and all sorts of reasons for encouraging it.

(Sir Anthony Gill) I think it would have been—to answer your fist question—more difficult to establish our position, as suppliers to the Japanese in the UK, had we not had that past connection. Although when we organised the past connection, we did not know about the Japanese coming to the UK. We have also developed our business elsewhere in the world, because of that relationship. For example we have a joint venture with the Japanese in the United States making car brakes. There have been lots of benefits from those relationships and the Japanese, as you know, are a relationship orientated people anyway. They attach a lot of importance to long-term relationships. As to the new technologies that you saw in Shirley, it is always possible to criticise the outside world for not picking up an idea soon enough. We have learned to be more patient about that. We are more irritated if they want it before we have got it! We tend, if we err at all, to try to err on the side of having developed something before the market need is showing itself and the story I told at the beginning is a good example of that. I think it is possible to speed up the use of that sort of technology, anti-crash technology and so on —as it would be possible to speed up the use of anti-lock braking systems. But that would probably require some sort of legislation and we are not great lovers of legislation.

526. Are you in favour of that or not? Are you in favour of a framework by the Government to encourage the development of such systems, or not?

(Sir Anthony Gill) By and large, no. I think the Government should stick to running the country and let the market decide what it needs.

Dr Bray

527. Your automotive people, in their information to us, say they have an increasing share of world market and expect to maintain a stable share of the UK market. That presumably reflects also the direction in which you see profitability going?

(Sir Anthony Gill) Yes.

528. Is it deliberate corporate strategy to go for that, rather than increased penetration in the UK?

(Sir Anthony Gill) Not really, not "deliberate" in that sense. In fact there is a 'sting in the tail' to that, which I will mention later. What drives us to go for world markets and go for markets everywhere—not just UK—is the fact that both the automotive and aerospace businesses are world businesses. The big players in the automotive worlds are international companies operating all over the place. The aerospace businesses are also world players. They tend not to operate all over the world, but they sell all over the world. They tend not to manufacture all over the world. Like Boeing, for example, manufactures in the States, but they operate and sell and regard themselves as a world company. So we have to be where the action is. We have to be where the customers are and we have to do what the customers want us to do, wherever they are. That is why we sell worldwide. The 'sting in the tail' of that is that we are a British company and there is a thing called ACT—advanced corporation tax—which is a charge on the UK dividends we pay on profits—although most of our profits are made overseas. As a result of this, we have had to make an involuntary non-interest bearing loan to the Government of £89 million—which we are unlikely ever to get back—in the form of ACT. We try to be as innovative in ideas as to how we can get that back, as we are with our products. So far we have not succeeded!

Sir Trevor Skeet

529. Sir Anthony, you are very keen on the development of the electrical car. How have you developed the sodium sulphur battery? Do you find it still a problem with the weight?

(Sir Anthony Gill) We have decided to get out of the electric vehicle development, which was at one time a joint development with Chloride, because the investment was mounting and we could not see the pay-off. That is partly because battery technology is not good enough to make the whole thing commercially viable. Because of our desire to move "up" to high tech systems, we decided to come out of so called 'commodity products'- including

[Sir Trevor Skeet *Contd]*

batteries—so we formed a joint venture with Yuasa —the biggest battery manufacturer in the world—a Japanese company—to provide us with a source of batteries for our after-market business, but decided not to make batteries and sell batteries in the way we used to—and certainly to withdraw from the quite expensive programmes to develop new battery technology that would have made a success possibly for the electric vehicle.

Mr Batiste

530. You have dealt with the Japanese over many years. To what extent do you think their emphasis on quality control, tight delivery times, after-sales service has forced you to develop the manufacturing qualities of your business, has given you an edge in becoming a world company that other companies which have not had that impetus from the Japanese earlier, missed out on?

(Sir Anthony Gill) I would credit the Japanese with influencing what we had to target as performance—appropriate levels of performance—to satisfy the needs of international customers. There are many big names who we have had the good fortune to enjoy as customers, who have had very demanding quality standards before the Japanese started to make cars. It is a remarkable thing that the Japanese did not start to make them until 1945. But the Japanese have managed to achieve the level of consistency in their pursuit of high standards in the area you have already mentioned, which has shaken a lot of us up and I think companies were brought face to face with that—either here or, in our case, by going to Japan, to see it working in our own licensees there some years ago. Companies that have not had that experience are at a disadvantage. Some of them are a bit unresponsive, when it comes to receiving messages about that sort of thing.

Cheryl Gillan

531. Has BS 5750 contributed to that process, because in the way in which you answer the questions in the questionnaire, you said that most companies in the UK were going for that accreditation and had it, but you never said whether you had gone for it yourself.

(Sir Anthony Gill) Just as our customers are making it clear what they expect from us to be long-term suppliers and to have a special relationship with them, so we make it clear to our suppliers how they have to perform to have a long-term relationship with us. BS 5750 is just one of the many methods to encapsulate a set of standards that we expect them to live by. By and large that sort of device and similar devices have been helpful.

Sir Gerard Vaughan

532. Am I right in thinking you are somewhat critical and concerned about the educational system and supply of graduates and technicians? Have you any comments at all on this?

(Sir Anthony Gill) Yes. Lucas have been committed to education and training for decades and, as we became more active overseas, and as we developed our operations overseas—and we do some of our R&D overseas—we became even more keenly aware that, right the way through from graduates, post-graduates, across to technicians, many of these countries seemed to be better off than we are in the UK. So that, compared with our spend on educating and training people in the UK, we did not have to match our proportion of sales income in these overseas countries. From this, we concluded that the British education system may be superb—as I believe it is—for the top seven per cent of the population, but it does not do a competitive job, compared competing with other countries, for the next 30 or 40 per cent. So, we set about trying to compensate for that within the company by some active programmes. One programme was the Lucas professor programme, which represented a device for new technology—new scientific information—coming into the company. But, it was actually started when we tried to recruit graduates in 'manufacturing systems engineering' and found that only ten universities in the country actually understood what that meant—let alone have a department training graduates in it. So the first three professors were professors in manufacturing systems engineering just to get departments established. So we have been pursuing that interest in education and training very actively for as long as I can remember —not as a charitable act, because we want to give universities money or anybody else money for training, but because it is necessary for the pace of change in our organisation to be achieved. So I am bound to say that we regard the systems in this country for education and training as deficient.

Chairman: Sir Anthony, thank you very much indeed. You have answered all our questions. I am sorry we have kept you slightly longer than we might have done. That has been to our benefit. Thank you very much indeed. If you would be kind enough to change places with the team from Ford and Lotus, we shall proceed.

Examination of Witnesses

MR P SLATER, Executive Director, Research & Development, Ford of Europe, MR B TYLER, Training Manager, Ford Britain, MR A PALMER, Managing Director, Group Lotus PLC, MR H KEMP, Operations Director, Lotus (Engineering Consultancy), were examined.

Chairman

533. Thank you very much for stepping forward. I must make certain I get it right. Mr Slater and Mr Tyler are from Ford and Mr Kemp and Mr Palmer are from Lotus.

(Mr Palmer) That is correct.

534. Some of the questions will be directed specifically, but others I am sure will invite you both to comment on behalf of your separate companies, but as you have seen how the questioning develops, I think you are now pretty well informed as to what type of questioning can be undertaken. Can I therefore open with a similar question that I asked Sir Anthony; Mr Slater, your Chairman's report makes admirable comment about the importance you attach to research and development, with £239.4 million on R&D in Britain and also the skills at Dunton. "Dunton is responsible for the continuing development of new engines for Ford vehicles. Ford is midway through a ten-year programme to renew all its European engine families." I think he then went on to say: "Our research and development centre in Dunton is unique in Britain and is unlikely ever to be matched by other manufacturers including the Japanese." That is pretty good stuff. The Committee likes to hear that. Will you tell us what is this great and unique process by which you decide to develop new products? Is it undertaken on a market by market basis, or process by process basis? How would you describe the Ford R&D success?

(Mr Slater) Well, as we said, at Dunton, we have the largest automotive development centre in Britain, but it is complemented by another large centre which is in Germany and belongs to our German company. We operate jointly with our German affiliated company and other European affiliated Ford companies, a European approach to product developments.

535. Is it possible to determine what sort of proportion comes from Germany or the Continent?

(Mr Slater) In terms of engineering efforts, about 55 to 60 per cent cent comes from Britain, about 40 to 45 per cent comes from Germany. As I say, we look at our market on a European basis. Our business strategy is to have competitive vehicle products in the major vehicle markets of Europe, major vehicle segments. To use popular phrases, the Fiesta segments, the Escort segments and the Mondeo type segment and commercial vehicles in the Transit segment. These are the largest we believe and most profitable segments for us to operate in. And we agree between all the operating companies a viable commercial cycle plan, that is at what interval in years shall we replace these products?

536. Does that include an estimated rate of return on a project by project basis? Any idea what it is?

(Mr Slater) Yes, it is adequate to meet our shareholders' requirements.

Sir Trevor Skeet

537. You cannot be more specific than that?

(Mr Slater) We try to be adequate to meet our shareholders' requirements. Obviously it varies from market to market. Some vehicle segments are more profitable than others. Others are essential to maintain the scale of the distribution businesses we seek to be in. We do not make as much money on small cars as we do on large cars.

538. Would you seek a higher return in Germany than the United Kingdom, or vice versa?

(Mr Slater) In general, no. In general we would seek a similar return in both markets. There may be specific reasons why in any particular year or particular run of years, Germany might be a place where we see the opportunity to make a higher return, it is expanding fast; or we might go through a period when Germany is suffering a recession and I think we would be hard pressed the make much return at all in Germany in the next few years. But to stick to the question in process, having decided what the cycle plan is and that sets up our objectives, this will lead us to work on one particular project at a time and we work obviously on replacing either the Fiesta of the Escort or whatever in succession and these programmes take about four years to implement, starting from preliminary design ideas and component system ideas, through to the final designs that are fit for production. So we are obviously running a number of these programmes in parallel.

Mrs Campbell

539. A question directed at both Lotus and Ford; I wonder how design is managed to divide between your research centres and what part do such factors as workforce skills play in determining the division of operations between centres? It would be easier if Ford could answer first, because I actually have a supplementary question for Lotus.

(Mr Slater) Okay, we have as I say, a long-standing arrangement for dividing the work between our British centre and our German centre, which are essentially related to functional skills. We do certain sorts of body engineering in our Dunton Centre and other sorts of body engineering in our Merkenich Centre. We do diesel engineering in Dunton and basic petrol engineering for example in Germany and things like that. Skills obviously play a very substantial part in that, in that once you have started doing that, you are obviously developing and refining skills which are there and though it is quite possible to change these arrangements from time to time and we do obviously occasionally have to consider changes, the natural process of skills

[**Mrs Campbell** *Contd*]
developing in a certain place, because that is where the work is done, tends to reinforce the system. We do obviously some long range work as a sort of, if you like, multi-national group. We do some of those in central labs in our parent company in the United States. Basic physics and chemistry and catalyst research is done there and again it is possible to do that work in Europe from time to time, but the greatest expertise in doing that work is in the States, because that is where we have done it for some time.

540. Perhaps Lotus could answer the same question?
(Mr Kemp) In terms of the engineering operation within Lotus, we are split into a consultancy business and a business that supports the car company. If I take the consultancy business, our skills base covers all of the major activities in design and development of passenger cars where we act as application engineers, taking technologies that may be conceived or developed in say a university through what we call a development process to get them to a level of readiness so they can be used within a vehicle production programme. We split our skills base into functions covering engine, transmission, body design, electronics, etc. across the full scope of the vehicle.

541. Can I ask you not about cars for the moment, but about the Lotus Superbike you developed, which had such a resounding success when Chris Bordman won an Olympic gold medal? I believe you have developed another version of it and perhaps you can tell us why you decided not to develop that in Norfolk, but to devolve that—I believe is it being developed in France and Wales now?
(Mr Kemp) No, it is being developed at our site.

Chairman

542. That is in Norfolk?
(Mr Kemp) In Norfolk. The technology of the cycle is to apply aerodynamics technology that we use for cars and apply it to the package of the rider plus the cycle and provide, on that basis, a new way of looking at the way the rider and the bicycle perform as an aerodynamic machine, rather than looking at the bike by itself. It is taking what we now understand from the automotive industry and applying that to something else.

Mrs Campbell

543. I understood that the inventor of the bike was accusing you of squandering the opportunity of a life time by failing to meet the demands if the bikes themselves. Is that totally untrue?
(Mr Palmer) We categorically deny that.

544. So the bike is being developed on the Norfolk site?
(Mr Palmer) Yes.

545. That is because you have the skills there on the site to develop it?
(Mr Palmer) Yes.

Mr Batiste

546. My question is to Ford. What is it that makes investment in the UK attractive to you as a company and are those factors likely to continue in the future?
(Mr Slater) Are you talking in general?

547. In general terms of investment, looking at your company in the round. Our enquiry is into the routes by which innovation works through into competitiveness and that covers the manufacturing as well as the R&D side.
(Mr Slater) The factors are obviously that we have good existing facilities in the UK and we have a skilled existing workforce in the UK that we feel we can rely on to accomplish the objectives of any particular programme we are trying to invest in, and of course I should say we have in the UK very good suppliers, such as Lucas, who can support us with high technology components that we need to support our objectives. We obviously do have concerns. Those are the general reasons and we continue to invest very large sums in the UK, so a general observation is that we are reasonably satisfied with what we are doing. But there are things that do give us long range concerns. Sir Anthony mentioned the concern about the performance of the education system in this country, which we would totally endorse. We are concerned that the general secondary and tertiary education system in this country is falling behind competitor nations in terms of the level of competence in basic mathematics, natural science and applied engineering, that we see coming out. Like Sir Anthony, I would exclude the top few per cent that come out, who are world competitive and that is a concern.

Chairman

548. Might I just ask a quick supplementary question there? Sir Anthony also referred to Lucas's investment to ensure the application of their particular system. Has Ford done similarly?
(Mr Slater) Yes, we have. Mr Tyler, who is with me, is the responsible Manager.
(Mr Tyler) Ford has had a long-standing relationship with universities, both in this country and of course in Germany, but we have something like 150 engineering sponsors, people, managers and supervisors who work in engineering, who work very, very closely with some 50 odd universities and polytechnics, recently aspiring universities up and down the country.

549. Are they Ford employees?
(Mr Tyler) These are Ford employees, who work with those institutions on a regular basis, fostering the exchanges, working on joint projects which have applications. These are very rarely pure research issues; these are application issues. The relationship is a chronic one. It is not a short term issue. It is something established over a long period of time.

Sir Gerard Vaughan

550. Do you find major gaps between the basic skills of personnel here and in Germany?
(Mr Slater) I would say we do—well basic skills. Yes, mathematical.

551. You talked about special training which would distort that, but basically, is that right?
(Mr Slater) We do find some basic gaps, yes.

552. Can you give us any idea where these gaps are greatest and most concerned?
(Mr Tyler) I think probably the two examples would be in the area of apprentices, where we have very similar schemes in Britain and Germany for apprenticeships for skilled work. In Britain, I think the tendency is to require more remedial work in elementary mathematics and numeracy and literacy skills, at a higher level than that might imply, but certainly at a level where people would be able to benefit from a traditional apprenticeship and to come out at the levels now required by our craftsmen to service and process very complex electro-mechanics and the like. The other area would be at the graduate level, where we invest very, very heavily upon internal programmes to supplement the general run of graduate qualifications of people coming into the company, in order to match colleagues in Germany.
Sir Gerard Vaughan: Have you any extra information on this that you would like to give us afterwards?

Chairman

553. You can send a written comment in if you like. Would you like to think about that?
(Mr Tyler) Yes, I would.[1]

Sir Trevor Skeet

554. Would you not add to your list that as compared with Germany, Britain is a financial centre of some provenance?
(Mr Slater) Yes, and that obviously we see in terms of the quality of skills we can get in the workforce in those areas, in financial analysis and planning skills are quite high.

555. Would you not also add to your list that we have an innovative science here which is quite unique in Europe?
(Mr Slater) Yes, I would. Unique? I think——

556. We invent many more things than we actually use.
(Mr Slater) Yes, I am not sure I have data that bears that out entirely. My impression is that the rate of research development in our specific field, which is automotive engineering, in our specific field, the rate of research development in this country is not up with that in Germany, nor in Japan, nor in the United States. Now in automotive engineering, Japan, the United States and Germany are the super league and for the UK not to be in that league is perhaps no disgrace, but in our particular segment that is how we would see it.

Chairman

557. Could I ask one supplementary question for information purposes? Are you to some extent dictated to by your corporate Head Quarters in the United States, as to where you may do your research, or is it entirely a matter for yourselves—forgetting the catalytic converter business, which was obviously a US speciality? Are you free agents as to where you do your research?
(Mr Slater) I think in the normal sense of the word, yes. Obviously the US company is the sole shareholder of our companies and if we were to say we wanted to—we had originated the idea of building yet another engineering centre in Britain, we would need consent, because it is a major capital project and would have to be cleared through the US Board. But it is certainly part of the management of the British company that it decides what engineering it will do and where it will do it and who it will do it with.

Mr Powell

558. If I may just briefly return to Sir Gerard's question, because Mr Slater undertook to let us have any further information he might wish to pass on about education and I wonder whether Mr Palmer and Sir Anthony might give some consideration to that, if they have any observations. Turning to Mr Palmer and Lotus, you have done extraordinarily well in recent years. Your engineering consultancy business you tell us has greatly expanded for the build up and run down of the Elan. I wonder if you can tell us how extensive your engineering consultancy work is, what proportion of large companies are your clients, what the experience of the Elan has meant to your company in terms of introducing new and further products and whether you are going to be able to maintain the advantage which you had as a result of its introduction against competition?
(Mr Palmer) A number of questions there all in one. I think first of all our engineering consultancy business is basically worldwide. It is predominantly Europe, the Far East, the USA and tends to follow the product side of the big manufacturers. There is a lot of product change and a lot of activity and we obviously follow with the consultancy business. So our tendency of share round the world tends to move quite considerably where there is a level of activity. Principally we work for many many clients—50, 60, 70 different types of client and I cannot obviously discuss who those are for confidentiality reasons, but the reason the consultancy business has grown has been principally because of new technologies; because of technologies, we are now at a certain stage where we are beginning to develop fully and new clients that have come on board with us over the last 12 to 18 months, we are really now doing quite

[1]See page 132.

[Mr Powell *Contd*]
extensive work for. We are a small fish in the General Motors empire and a large part of our consultancy work is for General Motors in various aspects of their businesses throughout the world, so we are today quite heavily dependent on them and most of our activity. However our success in the last 12 months has been business outside of the GM corporation.

Chairman

559. Has that helped you—the GM ownership—has that helped you obtain business worldwide which you otherwise would not have been able to obtain?

(Mr Palmer) I think to be very fair to General Motors, they have helped us to develop our expertise base and our knowledge and introduction to a number of clients around the world. So on that side, it is a positive. On the other side, of course there is a confidentiality potential conflict with General Motors and although we apply these rules quite rigidly and strictly, right through to the Chairman of General Motors, there is always an element of doubt as to clients we are talking to: "Is General Motors actually looking at this project or not?" I can categorically say they do not, but there is always that element of doubt, when you are part of a large conglomerate like General Motors. I would see that as a disadvantage. To return to your question on the Elan, the Elan for many reasons did not work for the company and certainly when I came and took the helm at the company, the right decision was to finish that particular project. We are by no means out of that segment or the car business. We have had to retrench and gather our troops again, ready to fight another day and we have just reintroduced another version of the Esprit and we are continuing to work on new products for the future. All we have done is retrenched, and regathered our troops. We are continuing to invest and develop new products and we will continue to do so. We will be back again very soon.

560. You intend to continue as a small company producing high quality vehicles in a competitive market?

(Mr Palmer) Absolutely, yes.

Mr Miller

561. First of all a question to Lotus, if I may, and then a variant on it to colleagues from Fords. In response to our questionnaire Lotus said quite categorically that 60 per cent or more of its manufacturing equipment is more modern than the average competitor, which obviously is an extremely good record. Can you maintain this lead and what life do you expect such equipment to have?

(Mr Palmer) We have made a lot of investment over the last several years under General Motors' ownership and that is one specific area where they have helped us a great deal, in investing quite heavily in tools and equipment and plant and also in areas of the engineering business where we can carry out successfully our consultancy operation. So most of it is fairly new and up-to-date and in some cases quite advanced. As to the longer term life of this and obviously further investment, I do not see any major change in policy, either with our company or with our present shareholders that would defer from a continuation of that investment.

562. Staying ahead of the game?

(Mr Palmer) Yes, absolutely. Without that, we would not continue to be a world leader in the consultancy business, so it is paramount.

Mr Miller: Mr Slater—and perhaps I ought to preface this by apologising if I sound a little blunt and it has no bearing on the fact that I represent a constituency that manufactures Vauxhalls——

Chairman: None at all!

Mr Miller

563. In your response to the same question, a paper was submitted, which I have to say is a little vague. You say in the context of overseas competitors, you would expect the equivalent in use in our UK plants to be at least of a similar vintage of that of our average foreign competitors and then in the context of the UK competitors: "We believe our facilities are at least the same." Given the scale of the Ford Motor Company and the worldwide network you have, can you not be a bit more specific about those questions?

(Mr Slater) I think we can be a little more specific, yes. First of all, the manufacturing equipment of our UK plants is every bit as modern as the equipment of our continental plants and our US plants. We do not have any distinctions in facility life through the world. We know a little bit about certain parts of our competitors that we have done specific studies on. We have not found, in any of those studies, any significant differences between our equipment life policies and our major competitors.

564. Your equipment?

(Mr Slater) Equipment life policies—how long we run a press line or how long we run a machine line.

565. If you, let us say, compared the Bridgend, Zeta plant with one I am familiar with, the Vauxhall V6 EcoTec plant, you would say you are both in the same league in terms of maintaining the competitive battle for that share of the market?

(Mr Slater) Yes, both in the same generation, yes.

Dr Bray

566. Looking at the medium term—not very long-term, not immediate short term—but medium term prospects, how important is the home market share for success in world markets? That is say, how important is the proportion of the UK car market that you have to your overall success?

(Mr Slater) As I am sure you know, the proportion of the UK market's car markets, to the

[**Dr Bray** *Contd*]
Western European's car markets fell very sharply over the last four years, due to the very, very high rates of growth experienced particularly in Germany, but also in France, Italy and to a less extent in Spain, where the UK was falling. What we are seeing now this year in 1993, is a UK growing moderately—in no sense back to the levels it was in 1989/90, but growing and very, very sharp falls—sharp falls are hard to predict, but 20 per cent plus in Germany, France and Italy. If those trends continue, if they continue, the UK's share of Western Europe will go back to its traditional level, which was about 20 per cent. It is still a long way to go.

567. We are interested particularly in what are the sources of competitive strength in the UK for the UK economy in general and how that is influenced by technology? I take it the figures that you have given for the distribution of your activity in Ford as between research, production, purchasing and sales as between the UK and other countries is not confidential?
(Mr Slater) No.

568. I note that your research efforts for example is 50/50 split between the UK and Germany. Your production is 40 per cent UK, 60 per cent Germany and your purchasing, 50/50. That would suggest that the UK is a good place you find to do research, not quite such a good place to do production?
(Mr Slater) We do have more of our assembly facilities outside Britain. Just to think of it in terms of large plants, we have two large car assembly plants in Britain, two in Germany, one in Belgium and one in Spain.

569. For a company like Ford, is the location of your research and development activity and links with the educational system, research and development base and so on, is it a material influence on the location of production?
(Mr Slater) If you are talking assembly and I think that is the sense of the question, the link is not total. You can for example—as General Motors does, not Lotus but the General Motors Car Group, the Vauxhall Opel Group, I believe does all its engineering and development in Germany, but it runs the bulk of its assembly operations in Germany too, but it runs very significant assembly operations in this country and in Spain. So it is perfectly feasible. We run a very significant assembly operation and indeed an engine manufacturing operation in Spain, without having product engineering in Spain. We run a very significant transmission plant in France, without having product engineering in France. I think GM does the same—it has a transmission plant in France.

570. What is the UK national interest in having a high level of research and development competence and skill?
(Mr Slater) From the point of view of the UK company, you mean?

571. From the point of view of UK Limited?
(Mr Slater) We earn a fee, which we charge to the affiliated company on its production for the value of the engineering input we provide to them.

572. Can it be argued that we are providing the know-how and the skills for the Spaniards and the French, better to compete with us?
(Mr Slater) But we are receiving engineering fees in return for that. If you like, it is an invisible export.

573. Can I ask a similar question of Lotus on this? Not just your own activities, but how you see the repercussions of engineering development work effecting the quality of competitiveness generally in the UK?
(Mr Palmer) I think our first comment is that in our type of business, we are a great supporter obviously of this country and the talent we get out of it and we are quite familiar with the skills base that we have here, that we can sell abroad and in fact we do successfully sell skill abroad, which is very important to our business. I think the difficulty we all have is keeping the talent in this country and not permanently residing somewhere else. But generally speaking, I agree with my colleague here, that we do sell a lot of our talent abroad and get a good income for it and as a consultancy business, that is a primary element for us.

Chairman

574. Unlike others, you are satisfied with the quality of the skill you obtain, but presumably you are a rather slender employer in relation to others?
(Mr Palmer) Of course, we are a very small scale operation in comparison, but I think the principle is same.
(Mr Slater) There is another benefit that the UK does receive from, shall we say, us designing Fiestas that are going to be made in Spain, UK suppliers supply components which are made in the UK and go into vehicles assembled in Spain to be sold in Italy, shall we say? We ourselves actually produce —well, for many years when we had carburettors on Fiestas, we made carburettors in Northern Ireland and supplied them.

Dr Bray

575. The popular idea is that Britain and other established industrial countries depend on high tech manufacturing, high value activity in order to compete with the newly industrialised countries and so we have to advance our technology. Is that an over-simplification of it? Is the reality of the fact that however high tech your technology, it will be exploited anywhere in the world?
(Mr Slater) I think it is generally true that all technology will eventually diffuse round the world and will be exploited. I think it is over-simplification to say that the role for the UK and the role for Germany and so forth is to export high tech to the NIC's to manufacture, a lot of what we do in a country like Spain, we can only do because we have

[**Dr Bray** *Contd*]
the manufacturing engineering know-how here and are developing that manufacturing know-how by actually producing things here.

576. Are there any dodges or wheezes you could suggest by which national technological skills can be more closely linked to the production and general competitiveness of industry, so that the strength of the benefit is gained adequately?
(Mr Slater) It is a very general question. I think I fall back on our standard list of the things which we believe are beneficial to manufacturing in general, which is low inflation and stable exchange rate and good transport and good education, things like that.

Chairman

577. It would be nice to be in first with a new technological development in the automotive industry and you would stick with it as long as you could?
(Mr Slater) Absolutely.

Dr Bray

578. Is the reality of the position that we must probably reconcile ourselves with having to run very fast technologically in order to stand still in overall production capabilities in the world today?
(Mr Slater) Turn it round the other way, run slowly and you will certainly go backwards!

Lynne Jones

579. I wanted to ask about your R&D, initially of Ford, but perhaps Lotus can chip in. In your questionnaire you said your R&D budget was what was affordable and I see it has actually gone up to four and a half per cent of turnover in 1991/92, as opposed to 2.3 per cent in 1981/82. In contrast, your spending on new manufacturing equipment has gone down over that period quite substantially; it has more or less halved. Why those trends and what do you mean by "affordable"? Does that indicate because R&D has gone up, you can afford more and why is that? The other point is that you spend very little of your R&D externally, but you do say that that is becoming increasingly significant and will be more important. Can you explain why that is and where the importance will lie? I notice that in terms of the answer to your question on which institutions would you approach to familiarise yourself with new technology, you said your component suppliers and I found that quite surprising. Could you explain why that is?
(Mr Slater) A lot of points there. Our spend on engineering, on product development has moved up over the time scales that you asked us, from slightly below three, to slightly over four per cent of turnover. That move is probably a sustainable trend. I think your question is: "Is this a trend?" I think that is a sustainable trend. I think very likely spending will have to be maintained at least four per cent of turnover; it may even have to go higher to maintain our competitive position.

580. Is that because of outside forces, forcing you to spend more on R&D and therefore you have to make it affordable?
(Mr Slater) Yes, basically increasing competition and it is forcing us to respond. The figures we showed you on per cent of our turnover that we spend on manufacturing investments, I am a bit surprised they showed a decline in trend. I can see the figures and I think that is random. I think if we looked at moving averages, *this* four years and *that* four years and *that* four years, we would have seen a much more constant position. I do not believe we have significantly slowed our rate of spend on facilities and manufacturing renewal, nor do we intend to. If anything, that will tend to rise. Sometimes we are renewing products that have a lot of facilities changes and sometimes we are out of phase there. Was your next question about external? We do not spend a lot of our money on external developments and most of our effort to get external work is spent on our supply base, or our effort is focused on our supply base. I have to say what we try to do is get our supply base to do it for nothing, so that we do not actually pay them, but we feel that they are working on components and system developments and it is very consistent and indeed necessary to achieve the overall system of vehicle objectives we are trying to achieve. When we work with outside, non-commercial research institutions like the universities, we are of course primarily guided in our choices, totally restricted in our choices, by whether the university institutions specialise in a field that is relevant to us and very very few in this country do and of course not only must they specialise, but they must have the level of expertise, general scientific expertise, that will allow us to rely on their work and accept it as good value. That is an area where sometimes we find it easier to go to the German technical universities, such as Hanover or München, where there is a more established tradition of specialisation in advanced engineering work in our field.

Chairman

581. Would Lotus care to comment on what they do in relation to research and develop, in-house and externally?
(Mr Palmer) I think a general point is that we use universities extensively in the UK, have done and have had a number of tremendous successes from that, so we are a strong supporter, is the first point. It is very easy to criticise; there is never enough; there is never enough money; there is never enough talent, but basically what we manage to do is to sift out in the areas where we work very closely together with the universities, we have had some tremendous success, which other larger manufacturers both here and overseas are currently enjoying some of that benefit today and hopefully will continue to enjoy to benefit in the future. I think the sad part, from our side of that, is that clearly most of our clients overseas are much more willing to invest for the benefit of developing these technologies than we find in the UK. Their funding is generally much more

[**Chairman** *Contd*]
available and we find—and this is just a general comment—that their long-term vision has a substantial wealth behind it and will support small companies like us, who have the ability to develop that technology for them. That is just a general comment, which is why most of our business is overseas, initially. We would much like it to stay here, but we have to go where we can get paid for our work.

(Mr Kemp) On the point of R&D for the company as a whole, it is split into two functions, one covering the car development which is run on the business case against each product line, and the other for engineering, where it is aimed at researching both techniques to meet new legislation demands, such as new devices to help improve the emission, safety or the economy of vehicles, and also to improve our competitiveness in terms of speed of being able to engineer products. Very much of the research goes into being able to predict and simulate the designs performance before we commit the designs to hardware, so that we can short-cut the time scale taken to generate new products.

Cheryl Gillan: Just following on from that, on the financial side, there seems to be a feeling from both of you that the financial climate in the UK is inadequate to support research and development and really the progress of both your companies in various ways. I notice in the Ford questionnaire, you replied that you wanted Government to encourage innovation through tax concessions for R&D expenditure and you at Lotus criticise and said there is little Government support for research, unless it was of a competitive nature, inadequate funding again. We have a combined budget this year coming up in November and I wondered if either or both of you have messages for the Chancellor of the Exchequer on what you would like to see to benefit your company, particularly the R&D and science and technology?

Chairman

582. Fairly brief answers, otherwise it will embarrass the Chancellor.

(Mr Palmer) I would like to give a very brief answer to that. We have, as a small company—but in our view a very important consultancy business round the world and therefore hopefully ultimately everybody will benefit—we have a situation where we work with the universities and we take the technology, we take often the people from universities to work with us and then we are basically left on our own until we can demonstrate the practicality of that technology before anyone else will adopt it and therefore, for a small business it is a tremendous financial pressure of what is a tremendously good idea created in Britain, something that we have to fund ourselves until someone will believe it will work. Our job is to prove that is does work. There is a big gap in between where there is no funding available. That is a big problem for us, because we have no Government help and most of our advanced technologies go abroad where funding is available.

(Mr Slater) I think more important than tax concession is the issue of direct funding, if you like subsidy of specific projects. We have had a number of very significant projects in recent years, which have benefited from funds distributed by the DTI under the Eureka programme. Mrs Jones asked Sir Anthony about enhanced vision and so forth. Those are very key projects in which Lucas is heavily involved. They have been supported by the Eureka programme. We have just been told by the DTI, following the recent White Paper on science and technology, that in order that the funds can be moved to small and medium companies, all large companies like Lucas and Ford will get nothing in future from the DTI under the Eureka and similar funds. We find that a little bit—there may have benefits long-term, but it is still a long shot from our point of view and we are fairly disappointed that support for our projects, which have been moderately successful to date, is going to be taken away.

Chairman: We take note of that.

Mrs Campbell

583. I want to ask a question really to do with the whole process of technology transfer and I think it is very pleasing to this Committee to hear how you both use university departments to a greater or lesser extent to develop some of your best research ideas and bring them back into the company. Another process by which you can transfer the technology is if you adopted a small high tech firm, which may have an innovative idea. Do you ever, as a matter of policy, acquire small high tech firms and actually use them as a research department, if you like? It is really addressed to both of you.

(Mr Palmer) Basically, because we are a small company ourselves, we do not buy other small companies, but what we do is form partnerships quite often with individuals who come to us with very good ideas and also small companies. So we would form a partnership probably to develop this technology through to manufacture.

584. So if a firm approached you, which had an innovative idea, you might develop a——

(Mr Palmer) It is quite possible we would have a arrangement, or a collaboration agreement to jointly develop as we have done in many, many cases.

(Mr Slater) It is different from case to case. There are occasions where we have acquired either the whole of a company, or a stake in a company, that has significant technology we wanted—ceramics was an example of that. Another example, more close to home, is the significant association we formed with an Australian company called Orbital, that had some technology in two stroke engine controls that we thought was promising and which we wanted to develop. We had a strategy that suggests that we ought to develop two stroke power sources as a possible need for the future. We have a large in-house programme. We needed their technology and we negotiated a substantial technology transfer payment deal with them.

Lynne Jones

585. Did they approach you, or you approach them?

(Mr Slater) It goes so far back, I do not think anybody would know.

586. In general would you be on the look out?

(Mr Slater) Yes.

Chairman

587. Could I ask perhaps Mr Slater, what about new technology coming along? For example, the pressure of environmental improvement on the one hand, or safety features on the other, are those sources of pressure that are dealt with in new technology? What are you aware of?

(Mr Slater) Absolutely. Everybody assumes now that if there is a technology coming that would give us zero emissions or zero waste, or zero carbon dioxide or something like that, that is clearly going to be intensified either by compulsion or whatever. So we give very high priority to those technologies that seem to be moving us that way. That is why we are spending so much money on electric vehicles, new materials, plastics and other things—batteries.

588. And Lotus, you are a consultancy, so presumably you are at the forefront?

(Mr Palmer) Yes, we are well ahead of emissions, which is a main priority. Environmental issues are the keen issues with every client. Legislation is getting extensive now, albeit very different across the world, so we get different messages coming in, and I think one thing we would quite like to see is some consistency. But of course the under-developed countries are catching up rapidly by using companies like us. Environmental issues whilst very important—emissions and particularly anti-noise now is very important, certainly for the car industry. Electric powered vehicles are beginning to emerge although the battery technology is not there yet, but hybrid technology is certainly there. The use of the combustion engine and the battery, particularly to get over situations in California, where there is a massive pressure at the moment, where we are all going to get caught if we are not careful. We are working very hard to solve those problems for major clients and ourselves right now. Basically, cost effective solutions to these technologies. It is very nice to have technologies; everybody wants them, but there has to be a cost effective solution to the application of those technologies and that is where we continue to specialise.

Lynne Jones

589. Is it legislation that is pulling us or is it the market? If you take something like air bags, there is no legislation, but companies are starting to fit them. Would there be a greater demand if there was legislation?

(Mr Palmer) I think it is both. I think legislation is making everybody aware, but certainly driven predominantly from the USA; there are more and more vehicles now moving into the USA and therefore the air bag technology for example and therefore people's awareness is much higher and I think it is becoming an expectation that a car has this technology.

590. If our legislation is behind on environmental or safety standards, is that going to have a detrimental effect on our industries?

(Mr Palmer) Ultimately it will, if we are behind, but we are working hard to make sure we do not get behind.

591. If there is legislation abroad, do you say: "We will make our products meet those standards in the UK", or do you say: "Let us still get away with the cheaper process while we can"?

(Mr Palmer) Ultimately we look for the most stringent in every area and work on the assumption that it will be here and therefore we will have to start today.

Mr Batiste

592. What has been the impact of the Japanese inward investment into the UK in relation to your market and also the way in which you organise your own operations? Perhaps Ford first.

(Mr Slater) I do not think it has had any big effect yet. We have this concern, which we have expressed elsewhere and which I know Sir Anthony does not share, but we have this concern that, shall I say, excessive expansion of the transplant operation will erode the supplier base in this country, but that is yet to be proved. We will have to wait events on that one.

593. In relation to your own internal operations, has it had an impact on your industrial relations, or speed of renewal of manufacturing plant?

(Mr Tyler) I think I would hark back to what Sir Anthony said earlier on, that in many ways we have been aware of some of the best practice, if you like, of Japanese companies for some considerable time back to the late seventies and eighties and a considerable amount of effort has been expended on improving our own internal organisation and development and deployment of resource. It is not something that has come on us in the last couple of years.

594. We have heard in evidence that one of the features of the Japanese car manufacture is their ability to turn around a new model from the concept to the marketplace in a much shorter space of time than their competitors, which means in a decade they have more models and therefore less risk in relation to each model. What is your view?

(Mr Slater) You have heard there are two things we should perhaps separate; one is that in the Japanese domestic market, the tradition is to replace the model after four years. In other words, the cycle life is only four years. By the way, that four years was imposed by the Government as a minimum separation between the two, because they were

[**Mr Batiste** *Contd*]
concerned that Toyota and Nissan would exhaust themselves financially and intellectually by too much competition on new product. The other thing you have heard is that the Japanese claim to have—various academics who have studied the Japanese claim they see—much shorter lead times between the starting of concept, getting the thing into production. I say in our case I believe we work to approximately a four year lead from concept to production and there is a lot of confusion on this subject. When people say that the Japanese are doing it in 27 months or something like that, they are probably not talking about what I was talking about when I said four years. Point one. Point two, there is some truth in it; the Japanese do things faster than we do, or faster than we have done in the past and a lot of the internal process changes that we are making and still have to make, are aimed at addressing that problem and becoming competitive on the span of the programme development.

595. What is the Lotus conception on that?
(Mr Kemp) I would add, on the perception of the two year design cycle of a Japanese car, that they actually invest a lot into shelf technologies. They invest into the technology to get it to a level where the uncertainty of it working or not working is very small and then they build that into their programmes. Because they have invested in this part of cycle ahead of the main programme, they then can make their development programme a shorter cycle. We have sold concepts as a consultant to the Japanese that have come along long after our period of involvement, because they have held them on the shelf. This is why they have the perception of a shorter time cycle for product introduction.

Mr Powell

596. Can I ask Mr Palmer, because in your written submission to us, you omitted to say—I assume deliberately—that Japan was a major competitor of yours, whereas most of the other people who have been replying to our surveys have highlighted the competition as one of the matters which they face. Can you enlighten us as to why Japan is not a significant competitive worry for you and are they clients of yours on a consultancy basis?
(Mr Palmer) I think there are two answers. Firstly, in terms of the car business at Lotus, we are so small, we are so specialist, that the Japanese are certainly not competitors of ours today. That does not mean to say they will not be in the future, but certainly today they are not. In the engineering consultancy business, they are not competitors, they are clients.
Chairman: That sounds very reasonable.

Lynne Jones

597. How much of the competitiveness of Japanese industry is as a result of Government aid, either direct or indirect?
(Mr Slater) In the field we are talking about here, science and technology, the Japanese Government would appear to us to be more effective in coordinating national efforts. In the the written evidence that we put into the Employment Committee following the March discussions, we put in a copy of a programme by the Japanese Ministry for International Trade and Industry, their paper on electric vehicle development, which they had circulated in 1991 and our point in bringing it to the attention of that Committee—and I think you may have seen (I am talking about 10 March evidence report) is that for 1991 the approach to electric vehicles, it showed a remarkable degree of coherent planning and target setting, which a Government Ministry in Japan was able to articulate, at which all sectors of Japanese industry, vehicle industry, battery makers, component makers, electric utilities and so forth could all work to one plan. Now, with the best will in the world, the DTI and other organs of this Government and the European institutions and so forth try to give us some sort of guidance and strategies and do not come anywhere close.

Mr Miller

598. Can I come back on that specific point? At Geneva this year, when you were displaying your new car the Mondeo, it was not the Japanese that were displaying the electric vehicles, it was the Europeans in a big way, but not with Ford. There was Fiat and Volvo, the hybrid vehicle—a whole range of vehicles. Where were Ford?
(Mr Slater) I am shocked to hear you say that!

599. It was not a very good display, obviously!
(Mr Slater) We were there with a vehicle called Ecostar, which you should have recognised, because the body is an Escort van, which is produced in a plant not far from your part of the world, converted by our electric vehicle group in the United States, which is now in initial series production and is I think the only vehicle in the world in series production. I exaggerate—we are building 120 of these vehicles and they are for pilot evaluation, but we are going to bring 20 odd into this country and evaluate them into various applications. It is the only vehicle in series production in the world which has a sodium sulphur battery and we showed that vehicle in Geneva. Your point is that the Europeans have got something and the Americans have got something and the Japanese did not seem to, as far as you can see in Geneva? That is true. The MITI saw that problem back in 1991, saw that the Americans and the Europeans were moving and maybe Toyota and Nissan were slow off the mark, and did something about it. That paper in this minutes report was published in November 1991 and it sets very specific targets year by year as to what we are all going to try and get to. My answer to Mrs Jones was, you know, when I see that sort of thing, I have to answer: "I do not believe we do get the sort of lead on new technologies from the Government that our Japanese competitors get from their Government." That is all I am saying.

600. Apologies for criticising your display. It was not as attractive as it could have been. That is

[Mr Miller *Contd]*

another point. Are you therefore saying such support ought to come at a European level or from national Government?

(Mr Slater) I suppose it has to come from the European level, but obviously the UK Government must play a major role - its role in forming a European consensus on this.

Lynne Jones

601. What about other aspects of Government guidelines, rather than anything else, in terms of trading policy, aid, direct support? Do you want to say anything?

(Mr Slater) Beyond what we have said? I do not think I have anything to add.

Chairman: Can we turn now to Dr Bray for the last question on suppliers?

Dr Bray

602. On the factors which led you to source in the UK or abroad, obviously price is very important, but Lotus do say that reasons for sourcing increasing from abroad, are because there are no UK suppliers and foreign suppliers are more technically advanced. What sort of area had you in mind?

(Mr Palmer) Generally speaking, our supplier base is historic. We have remained with various suppliers for a long long time and we are—I think what we indicated in there was a trend that more and more of our suppliers were coming to us from abroad, basically with more attractive prices, basically to help us to get some of these under-developed components into manufacture; so we have collaboration agreements with several of them as well and basically there is a much more open relationship with a number of these suppliers than we tend to get on average in the UK.

603. Can I hazard a guess and ask you whether it is right or not, and that is in inherently technologically advanced components, that the UK can maintain competitive advantage, whereas in less advanced components, it is more difficult because of easier application overseas? For example, I have in mind that Lucas will show you that they produce their prototypes of their jet engine control computers, the prototypes, on the same machine they used to produce the production versions. This prototype can demonstrate the reliability to go straight into flying on a jet engine. That standard —that speed of development in aerospace is not exactly characteristic of the motor industry and therefore one would expect that a country like the UK, which has an advanced and defence originated perhaps technological capability, it ought to be moving fastest in the most technologically advanced areas. Is that true or not?

(Mr Kemp) I suppose you are coming back to the point where the UK industry is directed to where it has high added value in terms of the manufacturing process it uses. If there is low added value, you go to some third world country to supply that particular part of the car. If you take the whole component industry, that supports car build, there is only a very small percentage of it that has very high added value, such as the electronic control units you mentioned. If we concentrate as a country on only the high technology components, we will eventually shrink down our manufacturing base. Therefore we need to continue to make the other components that go into a car.

604. First, is that true and second, so what?

(Mr Slater) I think you have to add another element, which is sometimes a problem with UK suppliers and that is their skill at maintaining quality and consistently improving quality and cost in mass production. I have to say, Lucas is an excellent example of a supplier that not only can innovate very high technology prototypes and build them and so forth, also is a master of the high volume manufacturing engineering skills needed to support a high volume industry like the motor industry. There are some UK suppliers, or people in the UK who would like to be suppliers to the motor industry, who qualify in the first sense—they have high technology, they can produce the prototypes fast, they understand the system integration requirements and so forth very well, but they do not have the manufacturing engineering skills to set up and run and continuously improve the manufacturing system that is continuously improving its quality and continuously reducing its costs and that is what we need to make our industry successful.

605. Would Lotus agree with that?

(Mr Kemp) Yes, I think the area of applying the technologies is an area where, if you look at our university courses and the level of emphasis on manufacturing technology, it is fairly small relative to the more scientific based technology. In essence, the area that will increase our competitiveness will be in the continuous improvement for the processes necessary for manufacturing our vehicles and products.

Chairman: Thank you very much gentlemen for answering our questions at considerable length. We are most grateful, not only for your coming, but for what you have been able to tell us; Mr Tyler and Mr Slater for Ford and Mr Palmer and Mr Kemp for Lotus, thank you very much indeed.

Memorandum submitted by the Ford Motor Company Ltd (21 July 1993)

FORD EXPERIENCE WITH OUTPUTS FROM THE UK EDUCATIONAL SYSTEM

Background

The Company has been a consistent and major recruiter of personnel for skill requirements in its UK operations at a number of levels; two of these in which we have experienced some problems are:

— Graduates (of all disciplines and for anticipated management succession requirements), and;
— Intakes to the Ford of Britain Apprentice Programme (training conducted "in-house" at three major sites: Dagenham, Merseyside, and S. Wales).

Particularly—but not exclusively—at times of high economic activity, when other employers, major and minor, are looking for similar people, the Company has experienced great difficulty in attracting sufficient high calibre people in these categories.

Some explanation for these difficulties lies in demographics, and some in the relatively low status accorded to manufacturing and industrial enterprises in this country versus elsewhere—particularly Germany. Some, however, is due to the lower proportion of output from the educational system which meets the employer's reasonable minimum requirements.

We are also concerned that considerably fewer students over the age of 16 are undertaking higher education in scientific rather than other subjects, with the result that the numbers of students qualifying in the sciences may be insufficient to sustain the future needs of the industrial base in this country.

(a) *Graduates*

Many graduates—particularly those from the former polytechnics or from more vocational programmes of study—demonstrate fully appropriate knowledge and skills in the areas of effective communication, basic business understanding, and the ability to work well with a wide range of colleagues. These qualities can not, however, be taken for granted, and the Company has instituted its own extensive programmes of "core skills" training for all graduates to meet this need. There are, in addition, highly structured programmes for engineering graduates related to their professional institution status, some elements of which, such as workshop basic skills training, are not standard on all engineering degree programmes. Specific further training, related to the needs of the job, is pursued subsequently—after this "remedial" training.

(b) *Apprentices*

Essentially, candidates for apprenticeships are school-leavers. Our experience there is that, if the Company were to be competing with other major employers for large numbers—particularly in the South-East—there would be insufficient acceptable candidates, especially those with an understanding of mathematics, who could successfully complete the intensive four-year programme culminating in an NVQ level 3 qualification. Even at present, when many employers are not recruiting apprentices, and our own intakes have been stabilised, we find many of the young people struggle to meet both Company and College of Further Education standards in knowledge and capability with mathematics. Remedial programmes have been developed to complement the standard Apprentice Programme and to ensure that output standards are not compromised, against the background of ever-increasing requirements for skill and knowledge levels once the young people qualify and are substantively placed in the Plants and other sites.

For some time, the Company has run a programme for school-leavers in the Newham area who do not meet minimum entry requirements to the Apprentice Programme, but who, after a further year of instruction, are judged legitimate applicants for the programme.

From discussions with external contacts, it appears the above examples are not uniquely the experience of Ford, but are also felt by other manufacturing companies—including some of our suppliers.

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